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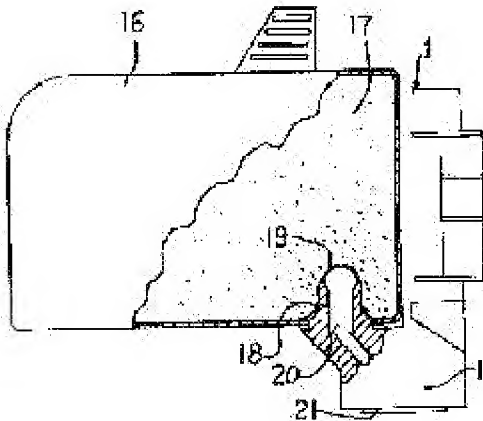
(54) RECORDING CARTRIDGE, AND INK JET RECORDING APPARATUS

(57)Abstract:

PURPOSE: To make accurate ink supply possible until the ink is entirely exhausted by a method wherein a filter, formed in projection heading toward an ink absorbent, is provided in close contact with the ink absorbent in an ink supply passage that connects the ink absorbent in an ink tank with a recording means.

CONSTITUTION: A filter 19 that is brought into close contact with an ink absorbent 17 in an ink tank 16 is provided to the front end of an ink supply passage 18 that is provided to a recording head 15. The filter 19 is formed in a hemispherical or an under-hemispherical shape so that it can project toward the ink absorbent 17. Thereby the front end of the ink supply passage 18 and the filter 19 are thrust deep into the ink absorbent 17, squeezing the ink absorbent 17, and thereby the density of the ink absorbent 17 in a part around the supply passage is heightened, and

adherence of the filter 19 to the ink absorbent 17 is increased. Therefore, the ink can be supplied stably until residual amount of the ink becomes almost nil.



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CLAIMS

[Claim(s)]

[Claim 1] The record cartridge characterized by preparing the filter by which a pressure welding is carried out to said ink absorber on the ink supply way for supplying ink to a record means from the ink absorber in an ink tank, and making this filter into the configuration which turns and projects in said ink absorber in the record cartridge which unified the record means and the ink tank.

[Claim 2] The record cartridge of claim 1 characterized by below a semi-sphere or one half having the spherical configuration for a lobe of a filter.

[Claim 3] The record cartridge of claim 1 to which the configuration for a lobe of a filter is characterized by the near spherical thing more nearly spherically than a semi-sphere.

[Claim 4] The record cartridge of claim 1 characterized by the amount of [of a filter] lobe being a cone configuration.

[Claim 5] The record cartridge of claim 1 characterized by the amount of [of a filter] lobe being the configuration of a truncated cone.

[Claim 6] The record cartridge of claim 1 characterized by the amount of [of a filter] lobe being the configuration of parabola body of revolution.

[Claim 7] The record cartridge of claim 1 characterized by the whole ink supply way having accomplished the filter.

[Claim 8] The record cartridge of claim 7 characterized by being crushed in a filter and preparing the reinforcement member for prevention.

[Claim 9] The record cartridge of claim 1 characterized by an ink supply way being a breadth configuration at last.

[Claim 10] The record cartridge of claim 9 characterized by making the configuration of an ink supply way thin towards a point so that it may become the filter configuration of a point, and a continuation side.

[Claim 11] The record cartridge of claim 1 characterized by arranging a reinforcement member along with the inside of a filter.

[Claim 12] The record cartridge of claim 1 characterized by being an ink jet record means by which said record means is equipped with the electric thermal-conversion object which generates the heat energy used in order to carry out the regurgitation of the ink.

[Claim 13] The record cartridge of claim 12 characterized by making ink breathe out from a delivery using film boiling which said record means produces in ink with the heat energy which said electric thermal-conversion object generates.

[Claim 14] It is the ink-jet recording apparatus characterized by to make it the configuration which the record cartridge which unified the record means and the ink tank

uses in the ink-jet recording apparatus which records on a recorded material by breathing out ink from a record means, and this record cartridge prepares the filter by which a pressure welding is carried out to said ink absorber in the ink supply way for supplying ink from the ink absorber in an ink tank to a record means, turns this filter to said ink absorber, and projects.

[Claim 15] The ink jet recording device of claim 14 characterized by being an ink jet record means by which said record means is equipped with the electric thermal-conversion object which generates the heat energy used in order to carry out the regurgitation of the ink.

[Claim 16] The ink jet recording device of claim 15 characterized by making ink breathe out from a delivery using film boiling which said record means produces in ink with the heat energy which said electric thermal-conversion object generates.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the ink jet recording device using the record cartridge and this record cartridge which unified the record means and the ink tank.

[0002]

[Description of the Prior Art] The recording device used as the compound-die electronic equipment containing the recording device which has functions, such as a printer, a copying machine, and facsimile, or a computer, a word processor, etc., or output equipment of a workstation is constituted so that the image may be recorded on recorded materials (record medium), such as a form and plastics sheet metal, based on image information. Said recording apparatus can be divided into an ink jet type, a wire dot type, a thermal type, a laser-beam type, etc. by the recording method.

[0003] In the recording device of the serial type which takes the serial scanning method which carries out horizontal scanning in the conveyance direction (the direction of vertical scanning) of a recorded material, and the crossing direction After setting a recorded material to a predetermined record location, an image is recorded with the record means carried on the carriage which moves along with a recorded material (horizontal scanning). Record of the whole recorded material is performed by performing paper feed (pitch conveyance) of the specified quantity, after ending record for one line, and repeating actuation of recording the image of the following line (horizontal scanning), to the recorded material which stopped again after that. Paper feed (pitch delivery) is performed continuously, setting a recorded material to a predetermined record location, it being put in block on the other hand, in the recording device of the Rhine type recorded only by vertical scanning of the conveyance direction of a recorded material, and recording one line, and record of the whole recorded material is performed.

[0004] An ink jet-type recording apparatus (ink jet recording apparatus) among the above-mentioned recording apparatus It is what records on a recorded material by breathing out ink from a record means (recording head). Miniaturization of a record means is easy and can record a high definition image at high speed. it is easy to be able to

record without needing processing special to a regular paper, for there to be little noise, since a running cost is cheap and it is a non impact method, and to record a color picture moreover using multicolor ink -- etc. -- it has the advantage. Much more improvement in the speed of record is possible for the equipment of the Rhine mold which uses a Rhine type record means by which many deliveries were arranged in the paper width direction especially.

[0005] By forming the electric thermal-conversion object produced on the substrate, an electrode, a liquid route wall, a top plate, etc. through semi-conductor manufacture processes, such as etching, vacuum evaporation, and sputtering, especially the record means (recording head) of the ink jet type which carry out the regurgitation of the ink using heat energy can manufacture easily what have liquid route arrangement (delivery arrangement) of high density, and can attain much more miniaturization. On the other hand, the demand to the quality of the material of a recorded material also has various things, and it has come to be required in recent years that thin paper, converted papers (paper with a punch hole for filing, paper with a perforation, paper of arbitrary configurations, etc.), etc. should be used else [, such as paper which is the usual recorded material, and resin sheet metal (OHP etc.),].

[0006] the exchangeable record cartridge which unified the record means (recording head) and the ink tank in the above-mentioned ink jet recording device -- use -- there are things. The thing of structure which prepares the filter by which a pressure welding is carried out to said ink absorber as this record cartridge in the ink supply way for supplying ink to a record means from the ink absorber in an ink tank is proposed.

[0007]

[Problem(s) to be Solved by the Invention] However, in the conventional example of such a record cartridge, since the configuration of an ink supply way and a filter was decided without taking into consideration the elasticity and the ink supply mechanism of an ink absorber, even when a lot of ink still remains, ink may not no longer be supplied. For example, although what made the filter section the flat surface or the concave surface is used, in such a configuration, the contact pressure of a filter and an ink absorber becomes weak, the clearance between air is made in a filter side, or capillary force benefits the consistency fall of an ink absorber weak, and ink assembly-comes to be hard to a feed zone. Consequently, if the ink flow resistance of a feed zone becomes large, and the turbulence of the ink regurgitation depended insufficient [ink supply] occurs and it becomes still severer, even if there are many ink residues, it will be in the "ink piece" condition of supply impossible, and will be in the condition that the regurgitation cannot be carried out.

[0008] That is, in the record cartridge used for the conventional ink jet recording apparatus, the above-mentioned filter side was a flat surface or a concave surface, and since the ink supply way was also straight, the following technical problems which should be solved occurred. The configuration of a filter will become [1st] a concave surface with the pressure of an ink absorber, or a concave degree will become a strong configuration. In the 2nd, an ink absorber pressure serves as max by the corner of an ink supply way, and the contact pressure fall of a filter side and the permanent set of an ink absorber occur. Since the ink supply way is straight, a clearance is made between the ink absorbers drawn with a root part, and air trespasses upon it from there the 3rd.

[0009] Furthermore, if such the mode occurs, the ink short supply by increase of the ink

flow resistance of an ink feed zone occurs, the air space which closes ink flow with the inconvenience that turbulence arises or the filter section of the ink regurgitation, completely is formed, and it will be in the condition of ink supply impossible, and although a lot of ink remains, un-arranging [that ink is no longer breathed out] will arise.

[0010] It is offering the ink jet recording device using the record cartridge which can perform the exact ink regurgitation which this invention's was made in view of the above-mentioned technical technical problem, could perform proper ink supply always stabilized until it became [whether the ink residue of the purpose of this invention is lost, and] pole small quantity, and was stabilized, and this record cartridge.

[0011]

[Means for Solving the Problem] This invention attains the above-mentioned purpose in the record cartridge which unified the record means and the ink tank by preparing the filter by which a pressure welding is carried out to said ink absorber in the ink supply way for supplying ink to a record means from the ink absorber in an ink tank, and considering as the configuration made into the configuration which turns this filter to said ink absorber, and projects.

[0012] Another this invention in the above-mentioned configuration In addition, a configuration with the configuration for a lobe of a filter spherical [below a semi-sphere or one half], The configuration for a lobe of a filter more nearly spherically than a semi-sphere A near spherical configuration, The configuration the amount of [of a filter / whose] lobe is a cone configuration, the configuration the amount of [of a filter / whose] lobe is the configuration of a truncated cone, The configuration the amount of [of a filter / whose] lobe is the configuration of parabola body of revolution, the configuration whose whole ink supply way has accomplished the filter, The configuration which is crushed in a filter and prepares the reinforcement member for prevention, the configuration whose ink supply way is a breadth configuration at last, The above-mentioned purpose is attained much more efficiently by considering as the configuration which makes the configuration of an ink supply way thin towards a point so that it may become the filter configuration of a point, and a continuation side, or the configuration which arranges a reinforcement member along with the inside of a filter.

[0013] In the ink jet recording device which records by still more nearly another this invention breathing out ink from a record means to a recorded material The record cartridge which unified the record means and the ink tank is used. This record cartridge On the ink supply way for supplying ink to a record means from the ink absorber in an ink tank The above-mentioned purpose is attained by preparing the filter by which a pressure welding is carried out to said ink absorber, and considering as the configuration made into the configuration which turns this filter to said ink absorber, and projects.

[0014]

[Example] Hereafter, the example of this invention is explained with reference to a drawing. Drawing 1 is the typical perspective view showing one example of the ink jet recording device which applied this invention. In drawing 1 , the ink jet recording apparatus is constituted so that it may record on the recorded materials 2, such as a form and plastics sheet metal, by breathing out ink from the record cartridge 1. The record cartridge 1 is ****(ed) by carriage 3 exchangeable. the guide rail 4 with which carriage 3 has been arranged in parallel along with a recorded material 2 -- meeting -- the direction

of an arrow head -- a round trip -- guidance support is carried out movable. Moreover, this carriage 3 is driven by the motor 5 through the pulley 6 of a pair, and the timing belt 8 laid among seven. Said record cartridge 1 has the structure which unified the record means (recording head) and the ink tank.

[0015] A recorded material 2 is conveyed through the ink discharge part of the record cartridge 1, and the location which counters with 2 sets of vertical-scanning rollers (roller pair) 9 and 10 arranged in the conveyance direction upstream and the downstream of the Records Department (paper feed = vertical scanning). In this way, while carriage 3 moves along with a recorded material 2 (horizontal scanning) Based on a picture signal, drive the ink discharge part of the record cartridge 1, and one line is recorded. After record for one line is completed, only the specified quantity rotates the vertical-scanning rollers 9 and 10, paper feed (vertical scanning) of the recorded material 2 is carried out in the direction of an arrow head, and the ink jet recording device recorded on the whole recorded material 2 is constituted by repeating these horizontal scanning and vertical scanning by turns.

[0016] In drawing 1, it is in the successive range of the record cartridge 1, and while securing the stability of the ink regurgitation of the recording head of the record cartridge 1, the recovery device 11 for preventing ink fixing in long-term neglect is arranged in the location which separated from the record section. The cap 12 for sealing an ink discharge part at the time of un-recording (capping) is formed in the front face of this recovery device 11. Generally this cap 12 is formed by rubber-like elasticity material in order to secure airtightness.

[0017] a part of record cartridge 1 to which drawing 2 applied this invention -- it is a fracture side elevation. In drawing 2, the record cartridge 1 is having unification structure which attached the record means (recording head) 15 in one although it was removable on the ink tank 16. The ink absorber 17 is contained inside the ink tank 16, and ink is stored by this ink absorber 17 where absorption maintenance is carried out. This ink absorber 17 is formed by the member which has elasticity by the shape of porous sponge, can absorb ink with a porous capillary tube property, and can be held.

[0018] The ink supply way 18 for supplying the ink in the ink absorber 17 to this recording head 15 is established in the recording head 15. The filter 19 which contacts the ink absorber 17 is formed in the point of this ink supply way 18, i.e., the edge by the side of the ink absorber 17. This filter 19 is for preventing invasion of the small air bubbles into the free passage hole 20 of the ink supply way 18 while removing the small dust in the ink supplied.

[0019] Said recording head (record means) 15 is an ink jet record means which carries out the regurgitation of the ink using heat energy, and is equipped with the electric thermal-conversion object for generating heat energy. Moreover, said recording head 15 records by making ink breathe out from a delivery by growth of air bubbles, and contraction using the pressure variation to produce according to film boiling produced with the heat energy impressed with said electric thermal-conversion object.

[0020] Drawing 3 is the partial perspective view showing typically the structure of the ink discharge part of said recording head 15. It sets to drawing 3 and they are a recorded material 2 and a predetermined clearance (for example, about about 0.5-2.0mm). It sets, and two or more deliveries 22 in a predetermined pitch are formed in the delivery forming face 21 which meets, and the electric thermal-conversion objects (exothermic

resistor etc.) 25 for generating the energy for ink regurgitation along with the wall surface of each liquid route 24 which opens the common liquid room 23 and each delivery 22 for free passage are arranged in it. In this example, the record cartridge 1 which has a recording head 15 is the physical relationship which is located in a line in the direction in which said delivery 22 intersects the main scanning direction of carriage 3, and is carried in this carriage 3. In this way, the electric thermal-conversion object 25 which corresponds based on a picture signal or a regurgitation signal is driven (energization), film boiling of the ink in a liquid route 24 is carried out, and the recording head 15 which makes ink breathe out is constituted from a delivery 22 by the pressure then generated.

[0021] In drawing 2, the filter 19 by which is prepared in the point of the ink supply way 18, and a pressure welding is carried out to the ink absorber 17 has the configuration which projects towards this ink absorber 17. In detail, with the filter 19 concerning the 1st example of drawing 2, the configuration for the lobe is spherical [below a semi-sphere or one half]. Therefore, they are raising the adhesion of a filter 19 and the ink absorber 17 while they enter deeply inside this ink absorber 17 as the point and filter 19 of the ink supply way 18 crush the ink absorber 17, and they raise the consistency of the feed zone (the near ink supply way 18) of the ink absorber 17.

[0022] According to the configuration of the ink supply way 18 of drawing 2, and a filter 19, highly, it is easy to concentrate a consistency on the ink supply way 18 neighborhood capillary force is strong, it has become, and, moreover, the ink in the ink absorber 17 can prevent effectively invasion of the air to the interface of a filter 19 and the ink absorber 17. In the example of illustration, the filter 19 is carrying out the breadth configuration at last, as for the point of the free passage hole 20 of the ink supply way 18, the cross section by the side of the ink absorber 17 becomes large by having accomplished the shape of a semi-sphere and having projected towards the ink absorber 17 side, according to such structure, abolished clearance generating by distortion of the ink absorber 17, and has prevented invasion of air. In addition, said filter 19 may be fixed with **** arrival, adhesives, etc. to the ink absorber 17.

[0023] Since according to the 1st example explained with reference to drawing 2 a filter 19 and the ink absorber 17 stick and still more sufficient contact pressure is obtained, the air bubbles which move in connection with ink flow are caught with the ink absorber 17 and filter 19 whose consistency improved (trap), and have invasion to the free passage hole 20 of the ink supply way 18 prevented. Moreover, the spherical filter 19 can be strengthened by the pressure of the ink absorber 17, it can hold an early configuration, without producing deformation, and can make the above-mentioned effectiveness maintain stably. Furthermore, since the point of the free passage hole 20 of the ink supply way 18 was made into the breadth configuration at last, the clearance between the ink absorber 17 and the ink supply way 18 can be filled, and invasion of air can be prevented effectively.

[0024] In addition, although improvement in a consistency of the ink absorber 17 can also be aimed at by lengthening the ink supply way 18, with such structure, the clearance between the ink absorber 17 and the ink supply way 18 becomes large, and it becomes difficult to prevent air infiltration. On the other hand, according to the structure of above-mentioned this example, this point has been improved and it became possible to prevent certainly the air infiltration of a between [the ink absorber 17 and the ink supply ways 18], and the air infiltration from a filter 19 to into the ink supply way 18 (free passage hole

20). In this way, according to the 1st example of drawing 2, always stabilized proper ink supply could be performed and the ink jet recording device using the record cartridge which can perform the stable exact ink regurgitation, and this record cartridge was offered until it became [whether an ink residue is lost and] pole small quantity.

[0025] Drawing 4 - drawing 10 are partial drawings of longitudinal section showing other examples of said filter 19, respectively. the 2nd example of drawing 4 -- the protrusion configuration of a filter 19 -- abbreviation -- it is spherically made a near thing and the surface area of this filter 19 is extended. According to such a configuration, since the surface area of a filter 19 is large, the flow resistance of ink can be lowered, and moreover, the contact pressure (adhesion force) to the ink absorber 17 of a filter 19 can be raised further.

[0026] The 3rd example of drawing 5 makes the protrusion configuration of a filter 19 a cone configuration. According to such a configuration, when the ink supply way 18 is long, or when the elasticity of the ink absorber 17 is strong, even if the pressure distribution of the pressure-welding section of the ink supply way 18 and the ink absorber 17 concentrate in the die-length direction of the ink supply way 18, the reinforcement of the filter 19 to this can be raised.

[0027] The 4th example of drawing 6 makes the protrusion configuration of a filter 19 a truncated-cone configuration. According to such a configuration, by preventing pressure concentration at the top-most vertices of a filter 19, the permanent deformation of the ink absorber 17 which carries out a pressure welding to this can be prevented, and the contact pressure (adhesion) of a filter 19 and the ink absorber 17 can be stabilized.

[0028] The 5th example of drawing 7 makes the protrusion configuration of a filter 19 the configuration of parabola body of revolution. According to such a configuration, the operation effectiveness of both the filter of the truncated-cone configuration of drawing 6 and the spherical filter of drawing 4 can be acquired. That is, while smoothing the pressure distribution of the pressure-welding section with the ink absorber 17, the deformation-proof reinforcement of a filter 19 can be raised.

[0029] The 6th example of drawing 8 arranges the reinforcement member 26 along with the medial surface of a filter 19. This reinforcement member 26 is for raising the deformation-proof reinforcement of a filter 19 and preventing crushing, and is formed by ink supply way 18 self or another member.

[0030] The 7th example of drawing 9 forms the whole also including the part of said ink supply way 18 with a filter 19, and forms the reinforcement member 26 along with the medial surface of this filter 19. That is, compared with each above-mentioned example, the part of the ink supply way 18 is abolished and the whole consists of filters 19.

According to such a configuration, a large area of a filter 19 can be taken and flow resistance of ink can be made still smaller.

[0031] The 8th example of drawing 10 makes area of a filter 19 small in the 1st example of above-mentioned drawing 2. Moreover, it extracts, and is made a curved surface 27 and the part whose point front face of the ink supply way 18 continued and which pastes up a filter 19 is also made into the shape of a continuation side. While it is possible to aim at a cost cut by making area of a filter 19 small according to such a configuration, the pressure distribution of the part in contact with the ink absorber 17 can be made smooth.

[0032] Since according to each example explained above a filter 19 and the ink absorber 17 stick and still more sufficient contact pressure is obtained, the air bubbles which move

in connection with ink flow are caught with the ink absorber 17 and filter 19 whose consistency improved (trap), and have invasion to the free passage hole 20 of the ink supply way 18 prevented. Moreover, a filter 19 can be strengthened by the pressure of the ink absorber 17, it can hold an early configuration, without producing deformation, and can make the above-mentioned effectiveness maintain stably. Furthermore, the clearance between the ink absorber 17 and the ink supply way 18 can be filled, and invasion of air can be prevented effectively.

[0033] Highly, it is easy to concentrate a consistency on the ink supply way 18 neighborhood capillary force is strong, it has become, and, moreover, the ink in the ink absorber 17 can prevent effectively invasion of the air to the interface of a filter 19 and the ink absorber 17. Furthermore, it became possible [the air infiltration from a filter 19 to into the ink supply way 18 (free passage hole 20)] to prevent certainly. In this way, always stabilized proper ink supply could be performed and the ink jet recording device using the record cartridge which can perform the stable exact ink regurgitation, and this record cartridge was offered until it became [whether an ink residue is lost and] pole small quantity.

[0034] In addition, although the ink jet recording device of the serial type which carries the record cartridge (record means) 1 in carriage 3, and carries out horizontal scanning along with a recorded material 2 was mentioned as the example and the above-mentioned example explained it, in the case of the Rhine type ink jet recording device using the record cartridge (record means) of the Rhine mold corresponding to the whole recording width or some of recorded material, this invention can be applied similarly, and can attain the same effectiveness. Moreover, although the case of the ink jet recording device for monochrome record which uses one record cartridge was mentioned as the example and the above-mentioned example explained it The ink jet recording device for color record using two or more record means to record this invention in the ink of a different color, Or the ink jet recording apparatus for gradation record using two or more record means to record in the ink in which concentration differs with the same color etc. can be similarly applied also regardless of the number of record means (record cartridge), and the same operation effectiveness can be attained.

[0035] In addition, although this invention is applicable to what uses the record means (recording head) using electric machine conversion objects, such as a piezo-electric element, etc., for example if it is an ink jet recording device, it brings about the effectiveness which was excellent especially in the ink jet recording device of the method which carries out the regurgitation of the ink using heat energy. It is because the densification of record and highly minute-ization can be attained according to this method.

[0036] About the typical configuration and typical principle, it is desirable to carry out for example, using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification. Although this method is applicable to both the so-called mold on demand and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the case of the mold on demand By impressing at least one driving signal which gives the rapid temperature rise which supports recording information and exceeds nucleate boiling Since make an electric thermal-conversion object generate heat energy, the heat operating surface of a record means (recording

head) is made to carry out film boiling, it corresponds to this driving signal as a result at one to one and the air bubbles in a liquid (ink) can be formed, it is effective.

[0037] A liquid (ink) is made to breathe out through opening for regurgitation by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instantly, the regurgitation of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0038] As a configuration of a recording head, the configuration using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 4459600 specification which indicate the configuration arranged to the field to which the heat operation section other than the combination configuration (a straight-line-like liquid flow channel or right-angle liquid flow channel) of a delivery which is indicated by each above-mentioned specification, a liquid route, and an electric thermal-conversion object is crooked is also included in this invention. In addition, this invention is effective also as a configuration based on the Provisional-Publication-No. 59 No. 138461 official report per year which indicates the configuration whose puncturing which absorbs the pressure wave of the Provisional-Publication-No. 59 No. 123670 official report per year which indicates the configuration which uses a common slit as the discharge part of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to a discharge part. Namely, no matter the gestalt of a recording head may be what thing, it is because it can record now efficiently certainly according to this invention.

[0039] Furthermore, this invention is effectively applicable also to the recording head of the full line type which has the die length corresponding to the maximum width of the recorded material (record medium) which can record a recording device. As such a recording head, any of the configuration which fills the die length with the combination of two or more recording heads, and the configuration as one recording head formed in one are sufficient. In addition, this invention is effective also when the thing of a serial type like an upper example also uses the recording head fixed to the body of equipment, the recording head exchangeable chip type to which the electric connection with the body of equipment and supply of the ink from the body of equipment are attained by the body of equipment being equipped, or the recording head of the cartridge type with which the ink tank was formed in the recording head itself in one.

[0040] Moreover, since the effectiveness of this invention can be stabilized further, it is desirable to add a recovery means, a preliminary auxiliary means, etc. for the recording head prepared in this invention as a configuration of a recording device. If these are mentioned concretely, it is effective in order to perform record stabilized by performing the preheating means by the capping means, the cleaning means, the pressurization or the suction means, the electric thermal-conversion object, the heating elements different from this, or such combination over a recording head, and auxiliary discharge appearance mode in which the regurgitation different from record is performed.

[0041] Moreover, also about the class thru/or the number of a recording head carried,

although only one piece was prepared corresponding to monochromatic ink, corresponding to two or more ink which differs in an others and record color or concentration, more than one may be prepared the number of pieces, for example. That is, although not only the recording mode of only mainstream colors, such as black, but a recording head may be constituted in one as a recording mode of a recording device, it may be based on two or more combination or any are sufficient for example, this invention is very effective also in equipment equipped with full color at least one by the double color color or color mixture of a different color.

[0042] Furthermore, in addition, in this invention example explained above, although ink is explained as a liquid What is ink solidified less than [a room temperature or it], and is softened or liquefied at a room temperature, Or by the ink jet method, since what carries out temperature control is common as a temperature control is performed for ink itself within the limits of 30 degrees C or more 70 degrees C or less and it is in the stabilization regurgitation range about the viscosity of ink, ink should just make the shape of liquid at the time of use record signal grant. In addition, [whether positively the temperature up by heat energy is prevented because you make it use it as energy of the change of state from a solid condition to the liquid condition of ink, and] It carries out whether the ink solidified in the state of neglect for the purpose of antifleashing of ink is used. Or anyway Ink liquefies by grant according to the record signal of heat energy, and this invention can be applied also when using the ink of the property which will not be liquefied without heat energy, such as that by which liquefied ink is breathed out, and a thing which it already begins to solidify when reaching a record medium.

[0043] The ink in such a case is good for a porosity sheet crevice or a through tube which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the condition of having been held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0044] Furthermore, in addition, as a gestalt of the ink jet recording device by this invention, although used as an image printing terminal of information management systems, such as a computer, the gestalt of the reproducing unit combined with others, a reader, etc. and the facsimile apparatus which has a transceiver function further may be taken.

[0045]

[Effect of the Invention] In the record cartridge which unified the record means and the ink tank according to this invention so that clearly from the above explanation Since it considered as the configuration made into the configuration which prepares the filter by which a pressure welding is carried out to said ink absorber in the ink supply way for supplying ink to a record means from the ink absorber in an ink tank, turns this filter to said ink absorber, and projects Always stabilized proper ink supply can be performed and the record cartridge which can perform the stable exact ink regurgitation is offered until it becomes [whether an ink residue is lost and] pole small quantity.

[0046] According to another this invention, in the above-mentioned configuration In addition, a configuration with the configuration for a lobe of a filter spherical [below a semi-sphere or one half], The configuration for a lobe of a filter more nearly spherically than a semi-sphere A near spherical configuration, The configuration the amount of [of a filter / whose] lobe is a cone configuration, the configuration the amount of [of a filter /

whose] lobe is the configuration of a truncated cone, The configuration the amount of [of a filter / whose] lobe is the configuration of parabola body of revolution, the configuration whose whole ink supply way has accomplished the filter, The configuration which is crushed in a filter and prepares the reinforcement member for prevention, the configuration whose ink supply way is a breadth configuration at last, Since it considered as the configuration which makes the configuration of an ink supply way thin towards a point so that it may become the filter configuration of a point, and a continuation side, or the configuration which arranges a reinforcement member along with the inside of a filter, the above-mentioned effectiveness can be attained much more efficiently.

[0047] In the ink jet recording device which records on a recorded material by breathing out ink from a record means according to still more nearly another this invention The record cartridge which unified the record means and the ink tank is used. This record cartridge On the ink supply way for supplying ink to a record means from the ink absorber in an ink tank Since it considered as the configuration made into the configuration which prepares the filter by which a pressure welding is carried out to said ink absorber, turns this filter to said ink absorber, and projects Always stabilized proper ink supply can be performed and the ink jet recording device which can perform the stable exact ink regurgitation is offered until it becomes [whether an ink residue is lost and] pole small quantity.

TECHNICAL FIELD

[Industrial Application] This invention relates to the ink jet recording device using the record cartridge and this record cartridge which unified the record means and the ink tank.

PRIOR ART

[Description of the Prior Art] The recording device used as the compound-die electronic equipment containing the recording device which has functions, such as a printer, a copying machine, and facsimile, or a computer, a word processor, etc., or output equipment of a workstation is constituted so that the image may be recorded on recorded materials (record medium), such as a form and plastics sheet metal, based on image information. Said recording apparatus can be divided into an ink jet type, a wire dot type, a thermal type, a laser-beam type, etc. by the recording method.

[0003] In the recording device of the serial type which takes the serial scanning method which carries out horizontal scanning in the conveyance direction (the direction of vertical scanning) of a recorded material, and the crossing direction After setting a recorded material to a predetermined record location, an image is recorded with the record means carried on the carriage which moves along with a recorded material (horizontal scanning). Record of the whole recorded material is performed by performing paper feed (pitch conveyance) of the specified quantity, after ending record for one line, and repeating actuation of recording the image of the following line (horizontal

scanning), to the recorded material which stopped again after that. Paper feed (pitch delivery) is performed continuously, setting a recorded material to a predetermined record location, it being put in block on the other hand, in the recording device of the Rhine type recorded only by vertical scanning of the conveyance direction of a recorded material, and recording one line, and record of the whole recorded material is performed. [0004] An ink jet-type recording apparatus (ink jet recording apparatus) among the above-mentioned recording apparatus It is what records on a recorded material by breathing out ink from a record means (recording head). Miniaturization of a record means is easy and can record a high definition image at high speed. it is easy to be able to record without needing processing special to a regular paper, for there to be little noise, since a running cost is cheap and it is a non impact method, and to record a color picture moreover using multicolor ink -- etc. -- it has the advantage. Much more improvement in the speed of record is possible for the equipment of the Rhine mold which uses a Rhine type record means by which many deliveries were arranged in the paper width direction especially.

[0005] By forming the electric thermal-conversion object produced on the substrate, an electrode, a liquid route wall, a top plate, etc. through semi-conductor manufacture processes, such as etching, vacuum evaporation, and sputtering, especially the record means (recording head) of the ink jet type which carry out the regurgitation of the ink using heat energy can manufacture easily what have liquid route arrangement (delivery arrangement) of high density, and can attain much more miniaturization. On the other hand, the demand to the quality of the material of a recorded material also has various things, and it has come to be required in recent years that thin paper, converted papers (paper with a punch hole for filing, paper with a perforation, paper of arbitrary configurations, etc.), etc. should be used else [, such as paper which is the usual recorded material, and resin sheet metal (OHP etc.),].

[0006] the exchangeable record cartridge which unified the record means (recording head) and the ink tank in the above-mentioned ink jet recording device -- use -- there are things. The thing of structure which prepares the filter by which a pressure welding is carried out to said ink absorber as this record cartridge in the ink supply way for supplying ink to a record means from the ink absorber in an ink tank is proposed.

EFFECT OF THE INVENTION

[Effect of the Invention] In the record cartridge which unified the record means and the ink tank according to this invention so that clearly from the above explanation Since it considered as the configuration made into the configuration which prepares the filter by which a pressure welding is carried out to said ink absorber in the ink supply way for supplying ink to a record means from the ink absorber in an ink tank, turns this filter to said ink absorber, and projects Always stabilized proper ink supply can be performed and the record cartridge which can perform the stable exact ink regurgitation is offered until it becomes [whether an ink residue is lost and] pole small quantity.

[0046] According to another this invention, in the above-mentioned configuration In addition, a configuration with the configuration for a lobe of a filter spherical [below a semi-sphere or one half], The configuration for a lobe of a filter more nearly spherically

than a semi-sphere A near spherical configuration, The configuration the amount of [of a filter / whose] lobe is a cone configuration, the configuration the amount of [of a filter / whose] lobe is the configuration of a truncated cone, The configuration the amount of [of a filter / whose] lobe is the configuration of parabola body of revolution, the configuration whose whole ink supply way has accomplished the filter, The configuration which is crushed in a filter and prepares the reinforcement member for prevention, the configuration whose ink supply way is a breadth configuration at last, Since it considered as the configuration which makes the configuration of an ink supply way thin towards a point so that it may become the filter configuration of a point, and a continuation side, or the configuration which arranges a reinforcement member along with the inside of a filter, the above-mentioned effectiveness can be attained much more efficiently.

[0047] In the ink jet recording device which records on a recorded material by breathing out ink from a record means according to still more nearly another this invention The record cartridge which unified the record means and the ink tank is used. This record cartridge On the ink supply way for supplying ink to a record means from the ink absorber in an ink tank Since it considered as the configuration made into the configuration which prepares the filter by which a pressure welding is carried out to said ink absorber, turns this filter to said ink absorber, and projects Always stabilized proper ink supply can be performed and the ink jet recording device which can perform the stable exact ink regurgitation is offered until it becomes [whether an ink residue is lost and] pole small quantity.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, in the conventional example of such a record cartridge, since the configuration of an ink supply way and a filter was decided without taking into consideration the elasticity and the ink supply mechanism of an ink absorber, even when a lot of ink still remains, ink may not no longer be supplied. For example, although what made the filter section the flat surface or the concave surface is used, in such a configuration, the contact pressure of a filter and an ink absorber becomes weak, the clearance between air is made in a filter side, or capillary force benefits the consistency fall of an ink absorber weak, and ink assembly-comes to be hard to a feed zone. Consequently, if the ink flow resistance of a feed zone becomes large, and the turbulence of the ink regurgitation depended insufficient [ink supply] occurs and it becomes still severer, even if there are many ink residues, it will be in the "ink piece" condition of supply impossible, and will be in the condition that the regurgitation cannot be carried out.

[0008] That is, in the record cartridge used for the conventional ink jet recording apparatus, the above-mentioned filter side was a flat surface or a concave surface, and since the ink supply way was also straight, the following technical problems which should be solved occurred. The configuration of a filter will become [1st] a concave surface with the pressure of an ink absorber, or a concave degree will become a strong configuration. In the 2nd, an ink absorber pressure serves as max by the corner of an ink supply way, and the contact pressure fall of a filter side and the permanent set of an ink absorber occur. Since the ink supply way is straight, a clearance is made between the ink

absorbers drawn with a root part, and air trespasses upon it from there the 3rd.

[0009] Furthermore, if such the mode occurs, the ink short supply by increase of the ink flow resistance of an ink feed zone occurs, the air space which closes ink flow with the inconvenience that turbulence arises or the filter section of the ink regurgitation, completely is formed, and it will be in the condition of ink supply impossible, and although a lot of ink remains, un-arranging [that ink is no longer breathed out] will arise.

[0010] It is offering the ink jet recording device using the record cartridge which can perform the exact ink regurgitation which this invention's was made in view of the above-mentioned technical technical problem, could perform proper ink supply always stabilized until it became [whether the ink residue of the purpose of this invention is lost, and] pole small quantity, and was stabilized, and this record cartridge.

MEANS

[Means for Solving the Problem] This invention attains the above-mentioned purpose in the record cartridge which unified the record means and the ink tank by preparing the filter by which a pressure welding is carried out to said ink absorber in the ink supply way for supplying ink to a record means from the ink absorber in an ink tank, and considering as the configuration made into the configuration which turns this filter to said ink absorber, and projects.

[0012] Another this invention in the above-mentioned configuration In addition, a configuration with the configuration for a lobe of a filter spherical [below a semi-sphere or one half], The configuration for a lobe of a filter more nearly spherically than a semi-sphere A near spherical configuration, The configuration the amount of [of a filter / whose] lobe is a cone configuration, the configuration the amount of [of a filter / whose] lobe is the configuration of a truncated cone, The configuration the amount of [of a filter / whose] lobe is the configuration of parabola body of revolution, the configuration whose whole ink supply way has accomplished the filter, The configuration which is crushed in a filter and prepares the reinforcement member for prevention, the configuration whose ink supply way is a breadth configuration at last, The above-mentioned purpose is attained much more efficiently by considering as the configuration which makes the configuration of an ink supply way thin towards a point so that it may become the filter configuration of a point, and a continuation side, or the configuration which arranges a reinforcement member along with the inside of a filter.

[0013] In the ink jet recording device which records by still more nearly another this invention breathing out ink from a record means to a recorded material The record cartridge which unified the record means and the ink tank is used. This record cartridge On the ink supply way for supplying ink to a record means from the ink absorber in an ink tank The above-mentioned purpose is attained by preparing the filter by which a pressure welding is carried out to said ink absorber, and considering as the configuration made into the configuration which turns this filter to said ink absorber, and projects.

EXAMPLE

[Example] Hereafter, the example of this invention is explained with reference to a drawing. Drawing 1 is the typical perspective view showing one example of the ink jet recording device which applied this invention. In drawing 1, the ink jet recording apparatus is constituted so that it may record on the recorded materials 2, such as a form and plastics sheet metal, by breathing out ink from the record cartridge 1. The record cartridge 1 is ****(ed) by carriage 3 exchangeable. the guide rail 4 with which carriage 3 has been arranged in parallel along with a recorded material 2 -- meeting -- the direction of an arrow head -- a round trip -- guidance support is carried out movable. Moreover, this carriage 3 is driven by the motor 5 through the pulley 6 of a pair, and the timing belt 8 laid among seven. Said record cartridge 1 has the structure which unified the record means (recording head) and the ink tank.

[0015] A recorded material 2 is conveyed through the ink discharge part of the record cartridge 1, and the location which counters with 2 sets of vertical-scanning rollers (roller pair) 9 and 10 arranged in the conveyance direction upstream and the downstream of the Records Department (paper feed = vertical scanning). In this way, while carriage 3 moves along with a recorded material 2 (horizontal scanning) Based on a picture signal, drive the ink discharge part of the record cartridge 1, and one line is recorded. After record for one line is completed, only the specified quantity rotates the vertical-scanning rollers 9 and 10, paper feed (vertical scanning) of the recorded material 2 is carried out in the direction of an arrow head, and the ink jet recording device recorded on the whole recorded material 2 is constituted by repeating these horizontal scanning and vertical scanning by turns.

[0016] In drawing 1, it is in the successive range of the record cartridge 1, and while securing the stability of the ink regurgitation of the recording head of the record cartridge 1, the recovery device 11 for preventing ink fixing in long-term neglect is arranged in the location which separated from the record section. The cap 12 for sealing an ink discharge part at the time of un-recording (capping) is formed in the front face of this recovery device 11. Generally this cap 12 is formed by rubber-like elasticity material in order to secure airtightness.

[0017] a part of record cartridge 1 to which drawing 2 applied this invention -- it is a fracture side elevation. In drawing 2, the record cartridge 1 is having unification structure which attached the record means (recording head) 15 in one although it was removable on the ink tank 16. The ink absorber 17 is contained inside the ink tank 16, and ink is stored by this ink absorber 17 where absorption maintenance is carried out. This ink absorber 17 is formed by the member which has elasticity by the shape of porous sponge, can absorb ink with a porous capillary tube property, and can be held.

[0018] The ink supply way 18 for supplying the ink in the ink absorber 17 to this recording head 15 is established in the recording head 15. The filter 19 which contacts the ink absorber 17 is formed in the point of this ink supply way 18, i.e., the edge by the side of the ink absorber 17. This filter 19 is for preventing invasion of the small air bubbles into the free passage hole 20 of the ink supply way 18 while removing the small dust in the ink supplied.

[0019] Said recording head

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the typical perspective view of one example of the ink jet recording device which applied this invention.

[Drawing 2] a part of 1st example of the record cartridge which applied this invention -- it is a fracture side elevation.

[Drawing 3] It is the partial perspective view showing typically the structure of the ink discharge part of the record means in drawing 2 .

[Drawing 4] It is partial drawing of longitudinal section showing the 2nd example of the filter in drawing 2 .

[Drawing 5] It is partial drawing of longitudinal section showing the 3rd example of the filter in drawing 2 .

[Drawing 6] It is partial drawing of longitudinal section showing the 4th example of the filter in drawing 2 .

[Drawing 7] It is partial drawing of longitudinal section showing the 5th example of the filter in drawing 2 .

[Drawing 8] It is partial drawing of longitudinal section showing the 6th example of the filter in drawing 2 .

[Drawing 9] It is partial drawing of longitudinal section showing the 7th example of the filter in drawing 2 .

[Drawing 10] It is partial drawing of longitudinal section showing the 8th example of the filter in drawing 2 .

[Description of Notations]

- 1 Record Cartridge
- 2 Recorded Material
- 3 Carriage
- 4 Guide Rail
- 5 Horizontal-Scanning Motor
- 8 Timing Belt
- 9 Vertical-Scanning Roller
- 10 Vertical-Scanning Roller
- 11 Recovery Device
- 12 Cap
- 15 Recording Head
- 16 Ink Tank
- 17 Ink Absorber
- 18 Ink Supply Way
- 19 Filter
- 20 Free Passage Hole
- 21 Delivery Forming Face
- 22 Delivery
- 25 Electric Thermal-Conversion Object

26 Reinforcement Member

27 Drawing Curved Surface

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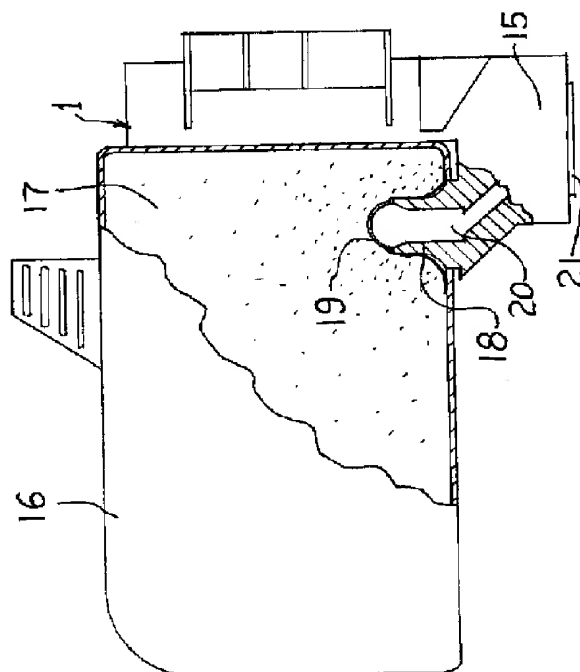
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(54) 【発明の名称】 記録カートリッジおよびインクジェット記録装置

(57) 【要約】

【目的】 インク残量が無くなるか極少量になるまで、常に安定した適正なインク供給を可能にし、安定した正確なインク吐出を可能にする。

【構成】 インクタンク内のインク吸収体から記録ヘッドへインクを供給するためのインク供給路に、前記インク吸収体に圧接されかつ該インク吸収体内へ突出する形状のフィルターを設ける。



【特許請求の範囲】

【請求項1】 記録手段とインクタンクを一体化した記録カートリッジにおいて、インクタンク内のインク吸収体から記録手段へインクを供給するためのインク供給路に、前記インク吸収体に圧接されるフィルターを設け、該フィルターを前記インク吸収体に向けて突出する形状にすることを特徴とする記録カートリッジ。

【請求項2】 フィルターの突出部分の形状が半球または半分以下の球状であることを特徴とする請求項1の記録カートリッジ。

【請求項3】 フィルターの突出部分の形状が半球より球状に近い球状であることを特徴とする請求項1の記録カートリッジ。

【請求項4】 フィルターの突出部分が円錐形状であることを特徴とする請求項1の記録カートリッジ。

【請求項5】 フィルターの突出部分が円錐台の形状であることを特徴とする請求項1の記録カートリッジ。

【請求項6】 フィルターの突出部分が放物線回転体の形状であることを特徴とする請求項1の記録カートリッジ。

【請求項7】 インク供給路全体がフィルターを成していることを特徴とする請求項1の記録カートリッジ。

【請求項8】 フィルター内に潰れ防止用の補強部材を設けることを特徴とする請求項7の記録カートリッジ。

【請求項9】 インク供給路が末広がり形状であることを特徴とする請求項1の記録カートリッジ。

【請求項10】 インク供給路の形状を、先端部のフィルター形状と連続面となるように先端部へ向けて細くすることを特徴とする請求項9の記録カートリッジ。

【請求項11】 フィルターの内側に沿って補強部材を配置することを特徴とする請求項1の記録カートリッジ。

【請求項12】 前記記録手段が、インクを吐出するために利用される熱エネルギーを発生する電気熱変換体を備えているインクジェット記録手段であることを特徴とする請求項1の記録カートリッジ。

【請求項13】 前記記録手段が、前記電気熱変換体が発生する熱エネルギーによりインクに生じる膜沸騰を利用して、吐出口よりインクを吐出させることを特徴とする請求項12の記録カートリッジ。

【請求項14】 記録手段から被記録材へインクを吐出して記録を行なうインクジェット記録装置において、記録手段とインクタンクを一体化した記録カートリッジを使用し、該記録カートリッジは、インクタンク内のインク吸収体から記録手段へインクを供給するためのインク供給路に、前記インク吸収体に圧接されるフィルターを設け、該フィルターを前記インク吸収体に向けて突出する形状にしたものであることを特徴とするインクジェット記録装置。

【請求項15】 前記記録手段が、インクを吐出するために利用される熱エネルギーを発生する電気熱変換体を備えているインクジェット記録手段であることを特徴とする請求項14のインクジェット記録装置。

【請求項16】 前記記録手段が、前記電気熱変換体が発生する熱エネルギーによりインクに生じる膜沸騰を利用して、吐出口よりインクを吐出させることを特徴とする請求項15のインクジェット記録装置。

【発明の詳細な説明】

10 【0001】

【産業上の利用分野】本発明は、記録手段とインクタンクを一体化した記録カートリッジおよび該記録カートリッジを用いるインクジェット記録装置に関する。

【0002】

【従来の技術】プリンター、複写機、ファクシミリ等の機能を有する記録装置、あるいはコンピューターやワードプロセッサ等を含む複合型電子機器やワークステーションの出力機器として用いられる記録装置は、画像情報に基づいて用紙やプラスチック薄板等の被記録材（記録媒体）に画像を記録していくように構成されている。前記記録装置は、記録方式により、インクジェット式、ワイヤドット式、サーマル式、レーザービーム式等に分類することができる。

【0003】被記録材の搬送方向（副走査方向）と交叉する方向に主走査するシリアルスキャン方式を採るシリアルタイプの記録装置においては、被記録材を所定の記録位置にセットした後、被記録材に沿って移動するキャリッジ上に搭載した記録手段によって画像を記録（主走査）し、1行分の記録を終了した後に所定量の紙送り（ピッチ搬送）を行い、その後に再び停止した被記録材に対して、次の行の画像を記録（主走査）するという動作を繰り返すことにより、被記録材全体の記録が行われる。一方、被記録材の搬送方向の副走査のみで記録するラインタイプの記録装置においては、被記録材を所定の記録位置にセットし、一括して1行分の記録を行ないながら連続的に紙送り（ピッチ送り）を行い、被記録材全体の記録が行われる。

【0004】上記記録装置のうち、インクジェット式の記録装置（インクジェット記録装置）は、記録手段（記録ヘッド）から被記録材にインクを吐出して記録を行うものであり、記録手段のコンパクト化が容易であり、高精細な画像を高速で記録することができ、普通紙に特別の処理を必要とせずに記録することができ、ランニングコストが安く、ノンインパクト方式であるため騒音が少なく、しかも、多色のインクを使用してカラー画像を記録するのが容易であるなどの利点を有している。中でも、紙幅方向に多数の吐出口を配列したラインタイプの記録手段を使用するライン型の装置は、記録の一層の高速化が可能である。

50 【0005】特に、熱エネルギーを利用してインクを吐

出するインクジェット式の記録手段（記録ヘッド）は、エッチング、蒸着、スパッタリング等の半導体製造プロセスを経て、基板上に製膜された電気熱変換体、電極、液路壁、天板などを形成することにより、高密度の液路配置（吐出口配置）を有するものを容易に製造することができ、一層のコンパクト化を図ることができる。一方、被記録材の材質に対する要求も様々なものがあり、近年では、通常の被記録材である紙や樹脂薄板（OHP等）などの他に、薄紙や加工紙（ファイリング用のパンチ孔付き紙やミシン目付き紙、任意な形状の紙など）などを使用することが要求されるようになってきた。

【0006】上記インクジェット記録装置においては、記録手段（記録ヘッド）とインクタンクを一体化した交換可能な記録カートリッジを使用することがある。この記録カートリッジとして、インクタンク内のインク吸収体から記録手段へインクを供給するためのインク供給路に、前記インク吸収体に圧接されるフィルターを設ける構造のものが提案されている。

【0007】

【発明が解決しようとする課題】しかしながら、このような記録カートリッジの従来例においては、インク供給路およびフィルターの形状は、インク吸収体の弾性特性やインク供給メカニズムを考慮せずに決められていたもので、まだ多量のインクが残っている場合でもインクが供給されなくなることがある。例えば、フィルター部を平面または凹面にしたものを使用されているが、このような形状では、フィルターとインク吸収体との接触圧力が弱くなり、フィルター面に空気の隙間ができたり、インク吸収体の密度低下のために毛管力が弱くなり、インクが供給部に集まり難くなる。その結果、供給部のインク流抵抗が大きくなり、インク供給不足によるインク吐出の乱れが発生し、さらにひどくなると、インク残量が多くても供給不能の“インク切れ”状態となり、吐出できない状態になる。

【0008】すなわち、従来のインクジェット記録装置に使用される記録カートリッジにおいては、上記フィルター面が平面または凹面であり、インク供給路もストレートであったので、次のような解決すべき課題があった。第1に、フィルターの形状がインク吸収体の圧力により凹面になったり、凹面の度合いが強い形状になってしまう。第2に、インク供給路の角部でインク吸収体圧力が最大となり、フィルター面の圧接力低下およびインク吸収体の永久歪みが発生する。第3に、インク供給路がストレートであるため、付け根部分で歪んだインク吸収体との間に隙間ができ、そこから空気が侵入する。

【0009】さらに、このようなモードが発生すると、インク供給部のインク流抵抗の増大によるインク供給不足が発生し、インク吐出の乱れが生じるという不都合、あるいは、フィルター部でインク流れを完全に塞ぐ空気層が形成され、インク供給不能の状態となり、多量のイ

ンクが残っているにもかかわらずインクが吐出されなくなるという不都合が生じることになる。

【0010】本発明は上記技術的課題に鑑みてなされたものであり、本発明の目的は、インク残量が無くなるか極少量になるまで、常に安定した適正なインク供給を行なうことができ、安定した正確なインク吐出を行なうことが可能な記録カートリッジおよび該記録カートリッジを用いるインクジェット記録装置を提供することである。

【0011】

【課題解決のための手段】本発明は、記録手段とインクタンクを一体化した記録カートリッジにおいて、インクタンク内のインク吸収体から記録手段へインクを供給するためのインク供給路に、前記インク吸収体に圧接されるフィルターを設け、該フィルターを前記インク吸収体に向けて突出する形状にする構成とすることにより、上記目的を達成するものである。

【0012】別の本発明は、上記構成に加えて、フィルターの突出部分の形状が半球または半分以下の球状である構成、フィルターの突出部分の形状が半球より球状に近い球状である構成、フィルターの突出部分が円錐形状である構成、フィルターの突出部分が円錐台の形状である構成、フィルターの突出部分が放物線回転体の形状である構成、インク供給路全体がフィルターを成している構成、フィルター内に潰れ防止用の補強部材を設ける構成、インク供給路が未広がり形状である構成、インク供給路の形状を、先端部のフィルター形状と連続面となるように先端部へ向けて細くする構成、あるいはフィルターの内側に沿って補強部材を配置する構成とすることにより、一層効率よく上記目的を達成するものである。

【0013】さらに別の本発明は、記録手段から被記録材へインクを吐出して記録を行なうインクジェット記録装置において、記録手段とインクタンクを一体化した記録カートリッジを使用し、該記録カートリッジは、インクタンク内のインク吸収体から記録手段へインクを供給するためのインク供給路に、前記インク吸収体に圧接されるフィルターを設け、該フィルターを前記インク吸収体に向けて突出する形状にしたものである構成とすることにより、上記目的を達成するものである。

【0014】

【実施例】以下、図面を参照して本発明の実施例を説明する。図1は本発明を適用したインクジェット記録装置の一実施例を示す模式的斜視図である。図1において、インクジェット記録装置は、記録カートリッジ1から用紙やプラスチック薄板等の被記録材2にインクを吐出して記録を行うように構成されている。記録カートリッジ1はキャリッジ3に交換可能に搭載されている。キャリッジ3は、被記録材2に沿って平行に配置されたガイドレール4に沿って矢印方向に往復移動可能に案内支持されている。また、このキャリッジ3は、モーター5によ

り、一対のプーリー6、7間に張架されたタイミングベルト8を介して駆動される。前記記録カートリッジ1は、記録手段（記録ヘッド）とインクタンクを一体化した構造を有する。

【0015】被記録材2は、記録部の搬送方向上流側および下流側に配設された2組の副走査ローラー（ローラー対）9、10により、記録カートリッジ1のインク吐出部と対向する位置を通して搬送（紙送り＝副走査）される。こうして、キャリッジ3が被記録材2に沿って移動（主走査）する間に、画像信号に基づいて記録カートリッジ1のインク吐出部を駆動して1行分の記録を行ない、1行分の記録が終了すると副走査ローラー9、10を所定量だけ回転させて被記録材2を矢印方向に紙送り（副走査）し、これらの主走査および副走査を交互に繰り返すことにより被記録材2の全体に記録するインクジェット記録装置が構成されている。

【0016】図1において、記録カートリッジ1の移動範囲内であって、記録領域を外れた位置には、記録カートリッジ1の記録ヘッドのインク吐出の安定性を確保するとともに長期放置の場合のインク固着を防止するための回復機構11が配設されている。この回復機構11の前面には、非記録時にインク吐出部を密閉（キャッピング）するためのキャップ12が設けられている。このキャップ12は、気密性を確保するため、一般にはゴム状弾性材で形成されている。

【0017】図2は、本発明を適用した記録カートリッジ1の一部破断側面図である。図2において、記録カートリッジ1は、記録手段（記録ヘッド）15をインクタンク16に着脱可能ではあるが一体的に組み付けた一体化構造をしている。インクタンク16の内部にはインク吸収体17が収納されており、インクは該インク吸収体17に吸収保持された状態で貯留されている。このインク吸収体17は、多孔質のスポンジ状で弾性を有する部材で形成されており、多孔質の毛細管特性によりインクを吸収し保持することができる。

【0018】記録ヘッド15には、インク吸収体17内のインクを該記録ヘッド15へ供給するためのインク供給路18が設けられている。このインク供給路18の先端部、すなわち、インク吸収体17側の端部には、インク吸収体17に当接するフィルター19が設けられている。このフィルター19は、供給されるインク中の小さなゴミを除去するとともに、インク供給路18の連通孔20内への小さな気泡の侵入を防止するためのものである。

【0019】前記記録ヘッド（記録手段）15は、熱エネルギーを利用してインクを吐出するインクジェット記録手段であって、熱エネルギーを発生するための電気熱変換体を備えたものである。また、前記記録ヘッド15は前記電気熱変換体によって印加される熱エネルギーにより生じる膜沸騰により気泡の成長、収縮によって生じ

る圧力変化を利用して、吐出口よりインクを吐出させ、記録を行うものである。

【0020】図3は、前記記録ヘッド15のインク吐出部の構造を模式的に示す部分斜視図である。図3において、被記録材2と所定の隙間（例えば、約0.5～2.0ミリ程度）をおいて対面する吐出口形成面21には、所定のピッチで複数の吐出口22が形成され、共通液室23と各吐出口22とを連通する各液路24の壁面に沿ってインク吐出用のエネルギーを発生するための電気熱変換体（発熱抵抗体など）25が配設されている。本例においては、記録ヘッド15を有する記録カートリッジ1は、前記吐出口22がキャリッジ3の主走査方向と交叉する方向に並ぶような位置関係で、該キャリッジ3に搭載されている。こうして、画像信号または吐出信号に基づいて対応する電気熱変換体25を駆動（通電）して、液路24内のインクを膜沸騰させ、その時に発生する圧力によって吐出口22からインクを吐出させる記録ヘッド15が構成されている。

【0021】図2において、インク供給路18の先端部に設けられてインク吸収体17に圧接されるフィルター19は、該インク吸収体17に向けて突出する形状を有している。詳しくは、図2の第1実施例に係わるフィルター19では、その突出部分の形状が半球または半分以下の球状になっている。したがって、インク供給路18の先端部およびフィルター19は、インク吸収体17を押し潰すようにして該インク吸収体17の内部へ深く入り込み、インク吸収体17の供給部（インク供給路18の近傍）の密度を高めるとともに、フィルター19とインク吸収体17との密着性を高めている。

【0022】図2のインク供給路18およびフィルター19の構成によれば、インク吸収体17内のインクは密度が高く毛管力が強くなっているインク供給路18付近に集中し易くなっており、しかも、フィルター19とインク吸収体17との界面への空気の侵入を効果的に防止することができる。図示の例では、フィルター19は半球状を成してインク吸収体17側へ向けて突出しており、かつ、インク供給路18の連通孔20の先端部は、インク吸収体17側の断面が大きくなる末広がりの形状をしており、このような構造によって、インク吸収体17の歪みによる隙間発生を無くし、空気の侵入を防止している。なお、前記フィルター19は、インク吸収体17に対して、熱熔着や接着剤等で固定してもよい。

【0023】図2を参照して説明した第1実施例によれば、フィルター19とインク吸収体17が密着し、さらに十分な圧接力が得られるので、インク流れに伴って移動してくる気泡は、密度が向上したインク吸収体17およびフィルター19によって捕捉（トラップ）され、インク供給路18の連通孔20への侵入を阻止される。また、球状のフィルター19は、インク吸収体17の圧力により強化され、変形を生じることなく初期の形状を保

持することができ、上記効果を安定的に持続させることができる。さらに、インク供給路18の連通路20の先端部を末広がり形状にしたので、インク吸収体17とインク供給路18との隙間を埋めることができ、空気の侵入を効果的に阻止することができる。

【0024】なお、インク供給路18を長くすることによりインク吸収体17の密度向上を図ることもできるが、このような構造では、インク吸収体17とインク供給路18との間の隙間が大きくなり、空気侵入を防止することが困難になる。これに対し、上記本実施例の構造によれば、この点が改善され、インク吸収体17とインク供給路18との間への空気侵入およびフィルター19からインク供給路18（連通路20）内への空気侵入を確実に防止することが可能となった。こうして、図2の第1実施例によれば、インク残量が無くなるか極少量になるまで、常に安定した適正なインク供給を行なうことができ、安定した正確なインク吐出を行なうことが可能な記録カートリッジおよび該記録カートリッジを用いるインクジェット記録装置が提供された。

【0025】図4～図10は、それぞれ、前記フィルター19の他の実施例を示す部分縦断面図である。図4の第2実施例は、フィルター19の突出形状を略球状に近いものにし、該フィルター19の表面積を広げたものである。このような構成によれば、フィルター19の表面積が大きいためにインクの流れ抵抗を下げることができ、しかもフィルター19のインク吸収体17に対する圧接力（密着力）を一層向上させることができる。

【0026】図5の第3実施例は、フィルター19の突出形状を円錐形状にしたものである。このような構成によれば、インク供給路18が長い場合あるいはインク吸収体17の弾性が強い場合に、インク供給路18とインク吸収体17との圧接部の圧力分布がインク供給路18の長さ方向に集中しても、これに対するフィルター19の強度を向上させることができる。

【0027】図6の第4実施例は、フィルター19の突出形状を円錐台形状としたものである。このような構成によれば、フィルター19の頂点での圧力集中を防止することにより、これに圧接するインク吸収体17の永久変形を防止することができ、フィルター19とインク吸収体17との圧接力（密着性）を安定化させることができる。

【0028】図7の第5実施例は、フィルター19の突出形状を放物線回転体の形状にしたものである。このような構成によれば、図6の円錐台形状のフィルターと図4の球状のフィルターの両方の作用効果を得ることができる。すなわち、インク吸収体17との圧接部の圧力分布を滑らかにするとともに、フィルター19の耐変形強度を向上させることができる。

【0029】図8の第6実施例は、フィルター19の内側面に沿って補強部材26を配置したものである。この

補強部材26は、フィルター19の耐変形強度を向上させて潰れを防止するためのものであり、インク供給路18自身あるいは別の部材で形成される。

【0030】図9の第7実施例は、前記インク供給路18の部分も含めて全体をフィルター19で形成し、該フィルター19の内側面に沿って補強部材26を設けたものである。すなわち、前述の各実施例に比べて、インク供給路18の部分を廃止し、全体をフィルター19で構成したものである。このような構成によれば、フィルター19の面積を大きく取ることができ、インクの流れ抵抗を一層小さくすることができる。

【0031】図10の第8実施例は、前述の図2の第1実施例において、フィルター19の面積を小さくしたものである。また、インク供給路18の先端部表面は連続した絞り曲面27にされ、フィルター19を接着する部分も連続面状にされている。このような構成によれば、フィルター19の面積を小さくすることによりコストダウンを図ることが可能であるとともに、インク吸収体17と接触する部分の圧力分布を滑らかなものにするができる。

【0032】以上説明した各実施例によれば、フィルター19とインク吸収体17が密着し、さらに十分な圧接力が得られるので、インク流れに伴って移動してくる気泡は、密度が向上したインク吸収体17およびフィルター19によって捕捉（トラップ）され、インク供給路18の連通路20への侵入を阻止される。また、フィルター19は、インク吸収体17の圧力により強化され、変形を生じることなく初期の形状を保持することができ、上記効果を安定的に持続させることができる。さらに、インク吸収体17とインク供給路18との隙間を埋めることができ、空気の侵入を効果的に阻止することができる。

【0033】また、インク吸収体17内のインクは密度が高く毛管力が強くなっているインク供給路18付近に集中し易くなっており、しかも、フィルター19とインク吸収体17との界面への空気の侵入を効果的に防止することができる。さらに、フィルター19からインク供給路18（連通路20）内への空気侵入も確実に防止することが可能となった。こうして、インク残量が無くなるか極少量になるまで、常に安定した適正なインク供給を行なうことができ、安定した正確なインク吐出を行なうことが可能な記録カートリッジおよび該記録カートリッジを用いるインクジェット記録装置が提供された。

【0034】なお、前述の実施例では、記録カートリッジ（記録手段）1をキャリアリッジ3に搭載し、被記録材2に沿って主走査するシリアルタイプのインクジェット記録装置を例に挙げて説明したが、本発明は、被記録材の記録幅の全体または一部に対応するライン型の記録カートリッジ（記録手段）を用いるラインタイプのインクジェット記録装置の場合にも、同様に適用することがで

き、同様の効果を達成し得るものである。また、前述の実施例では、1個の記録カートリッジを用いる単色記録用のインクジェット記録装置の場合を例に挙げて説明したが、本発明は、異なる色のインクで記録する複数の記録手段を用いるカラー記録用のインクジェット記録装置、あるいは同一色彩で濃度の異なるインクで記録する複数の記録手段を用いる階調記録用のインクジェット記録装置など、記録手段（記録カートリッジ）の数にも関係なく同様に適用することができ、同様の作用効果を達成し得るものである。

【0035】なお、本発明は、インクジェット記録装置であれば、例えば、 piezo素子等の電気機械変換体等を用いる記録手段（記録ヘッド）を使用するものに適用できるが、中でも、熱エネルギーを利用してインクを吐出する方式のインクジェット記録装置において優れた効果をもたらすものである。かかる方式によれば、記録の高密度化、高精細化が達成できるからである。

【0036】その代表的な構成や原理については、例えば、米国特許第4723129号明細書、同第4740796号明細書に開示されている基本的な原理を用いて行なうのが好ましい。この方式は、所謂オンデマンド型、コンティニュアス型のいずれにも適用可能であるが、特に、オンデマンド型の場合には、液体（インク）が保持されているシートや液路に対応して配置されている電気熱変換体に、記録情報に対応して核沸騰を越える急速な温度上昇を与える少なくとも一つの駆動信号を印加することによって、電気熱変換体に熱エネルギーを発生せしめ、記録手段（記録ヘッド）の熱作用面に膜沸騰させて、結果的にこの駆動信号に一对一に対応し液体（インク）内の気泡を形成出来るので有効である。

【0037】この気泡の成長、収縮により吐出用開口を介して液体（インク）を吐出させて、少なくとも一つの滴を形成する。この駆動信号をパルス形状とすると、即時適切に気泡の成長収縮が行なわれるので、特に応答性に優れた液体（インク）の吐出が達成でき、より好ましい。このパルス形状の駆動信号としては、米国特許第4463359号明細書、同第4345262号明細書に記載されているようなものが適している。尚、上記熱作用面の温度上昇率に関する発明の米国特許第4313124号明細書に記載されている条件を採用すると、更に優れた記録を行なうことができる。

【0038】記録ヘッドの構成としては、上述の各明細書に開示されているような吐出口、液路、電気熱変換体の組み合わせ構成（直線状液流路又は直角液流路）の他に熱作用部が屈曲する領域に配置されている構成を開示する米国特許第4558333号明細書、米国特許第4459600号明細書を用いた構成も本発明に含まれるものである。加えて、複数の電気熱変換体に対して、共通するスリットを電気熱変換体の吐出部とする構成を開示する特開昭59年第123670号公報や熱エネルギー

一の圧力波を吸収する開孔を吐出部に対応させる構成を開示する特開昭59年第138461号公報に基づいた構成としても本発明は有効である。すなわち、記録ヘッドの形態がどのようなものであっても、本発明によれば、記録を確実に効率よく行なうことができるようになるからである。

【0039】さらに、記録装置が記録できる被記録材（記録媒体）の最大幅に対応した長さを有するフルラインタイプの記録ヘッドに対しても、本発明は有効に適用できる。そのような記録ヘッドとしては、複数記録ヘッドの組み合わせによってその長さを満たす構成や、一体的に形成された1個の記録ヘッドとしての構成のいずれでもよい。加えて、上例のようなシリアルタイプのものでも、装置本体に固定された記録ヘッド、あるいは装置本体に装着されることで装置本体との電気的な接続や装置本体からのインクの供給が可能になる交換自在のチップタイプの記録ヘッド、あるいは記録ヘッド自体に一体的にインクタンクが設けられたカートリッジタイプの記録ヘッドを用いた場合にも本発明は有効である。

【0040】また、本発明に記録装置の構成として設けられる記録ヘッドに対しての回復手段や予備的な補助手段などを付加することは、本発明の効果を一層安定できるので好ましいものである。これらを具体的に挙げれば、記録ヘッドに対しての、キャッピング手段、クリーニング手段、加圧或は吸引手段、電気熱変換体或はこれとは別の加熱素子或はこれらの組み合わせによる予備加熱手段、記録とは別の吐出を行なう予備吐出モードを行なうことも安定した記録を行なうために有効である。

【0041】また、搭載される記録ヘッドの種類ないし個数についても、例えば、単色のインクに対応して1個のみが設けられたものの他、記録色や濃度を異にする複数のインクに対応して複数個数設けられるものであってもよい。すなわち、例えば、記録装置の記録モードとしては、黒色等の主流色のみの記録モードだけではなく、記録ヘッドを一体的に構成するか複数個の組み合わせによるか、いずれでもよいが、異なる色の複色カラー又は、混色によるフルカラーの少なくとも一つを備えた装置にも本発明は極めて有効である。

【0042】さらに加えて、以上説明した本発明実施例においては、インクを液体として説明しているが、室温やそれ以下で固化するインクであって、室温で軟化もしくは液化するもの、あるいは、インクジェット方式では、インク自体を30℃以上70℃以下の範囲内で温度調整を行ってインクの粘性を安定吐出範囲にあるように温度制御するものが一般的であるから、使用記録信号付与時にインクが液状をなすものであればよい。加えて、積極的に熱エネルギーによる昇温をインクの固形状態から液体状態への状態変化のエネルギーとして使用せしめることで防止するか、または、インクの蒸発防止を目的として放置状態で固化するインクを用いるかして、い

れにしても、熱エネルギーの記録信号に応じた付与によってインクが液化し、液状インクが吐出されるものや、記録媒体に到達する時点ではすでに固化し始めるもの等のような、熱エネルギーによって初めて液化する性質のインクを使用する場合も本発明は適用可能である。

【0043】このような場合のインクは、特開昭54-56847号公報あるいは特開昭60-71260号公報に記載されるような、多孔質シート凹部または貫通孔に液状または固形物として保持された状態で、電気熱変換体に対して対向するような形態としてもよい。本発明においては、上述した各インクに対して最も有効なものは、上述した膜沸騰方式を実行するものである。

【0044】さらに加えて、本発明によるインクジェット記録装置の形態としては、コンピュータ等の情報処理機器の画像出力端末として用いられるものの他、リーダー等と組み合わせた複写装置、さらには送受信機能を有するファクシミリ装置の形態を採るもの等であってもよい。

【0045】

【発明の効果】以上の説明から明らかなごとく、本発明によれば、記録手段とインクタンクを一体化した記録カートリッジにおいて、インクタンク内のインク吸収体から記録手段へインクを供給するためのインク供給路に、前記インク吸収体に圧接されるフィルターを設け、該フィルターを前記インク吸収体に向けて突出する形状にする構成としたので、インク残量が無くなるか極少量になるまで、常に安定した適正なインク供給を行なうことができ、安定した正確なインク吐出を行なうことが可能な記録カートリッジが提供される。

【0046】別の本発明によれば、上記構成に加えて、フィルターの突出部分の形状が半球または半分以下の球状である構成、フィルターの突出部分の形状が半球より球状に近い球状である構成、フィルターの突出部分が円錐形状である構成、フィルターの突出部分が円錐台の形状である構成、フィルターの突出部分が放物線回転体の形状である構成、インク供給路全体がフィルターを成している構成、フィルター内に潰れ防止用の補強部材を設ける構成、インク供給路が未広がり形状である構成、インク供給路の形状を、先端部のフィルター形状と連続面となるように先端部へ向けて細くする構成、あるいはフィルターの内側に沿って補強部材を配置する構成としたので、一層効率よく上記効果を達成することができる。

【0047】さらに別の本発明によれば、記録手段から被記録材へインクを吐出して記録を行なうインクジェット記録装置において、記録手段とインクタンクを一体化した記録カートリッジを使用し、該記録カートリッジは、インクタンク内のインク吸収体から記録手段へインクを供給するためのインク供給路に、前記インク吸収体に圧接されるフィルターを設け、該フィルターを前記イ

ンク吸収体に向けて突出する形状にしたものである構成としたので、インク残量が無くなるか極少量になるまで、常に安定した適正なインク供給を行なうことができ、安定した正確なインク吐出を行なうことが可能なインクジェット記録装置が提供される。

【図面の簡単な説明】

【図1】本発明を適用したインクジェット記録装置の一実施例の模式的斜視図である。

【図2】本発明を適用した記録カートリッジの第1実施例の一部破断側面図である。

【図3】図2中の記録手段のインク吐出部の構造を模式的に示す部分斜視図である。

【図4】図2中のフィルターの第2実施例を示す部分縦断面図である。

【図5】図2中のフィルターの第3実施例を示す部分縦断面図である。

【図6】図2中のフィルターの第4実施例を示す部分縦断面図である。

【図7】図2中のフィルターの第5実施例を示す部分縦断面図である。

【図8】図2中のフィルターの第6実施例を示す部分縦断面図である。

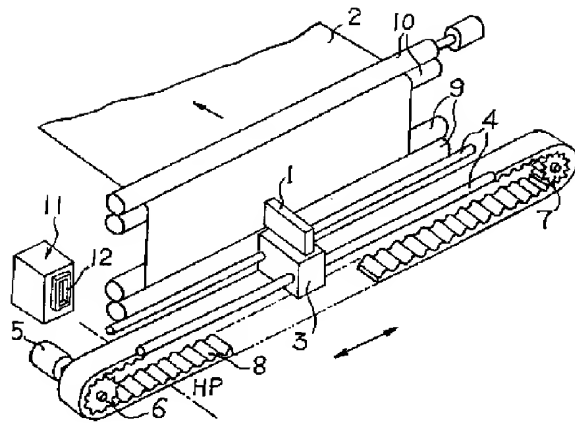
【図9】図2中のフィルターの第7実施例を示す部分縦断面図である。

【図10】図2中のフィルターの第8実施例を示す部分縦断面図である。

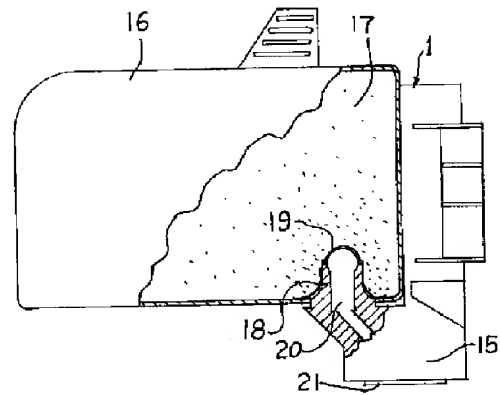
【符号の説明】

- | | |
|----|----------|
| 1 | 記録カートリッジ |
| 2 | 被記録材 |
| 3 | キャリッジ |
| 4 | ガイドレール |
| 5 | 主走査モーター |
| 8 | タイミングベルト |
| 9 | 副走査ローラー |
| 10 | 副走査ローラー |
| 11 | 回復機構 |
| 12 | キャップ |
| 15 | 記録ヘッド |
| 16 | インクタンク |
| 17 | インク吸収体 |
| 18 | インク供給路 |
| 19 | フィルター |
| 20 | 連通孔 |
| 21 | 吐出口形成面 |
| 22 | 吐出口 |
| 25 | 電気熱変換体 |
| 26 | 補強部材 |
| 27 | 絞り曲面 |

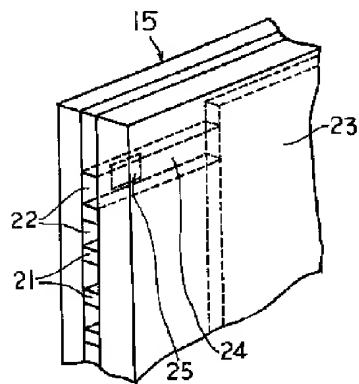
【図1】



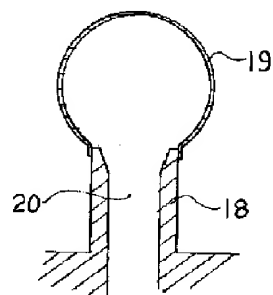
【図2】



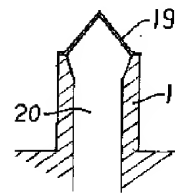
【図3】



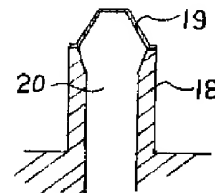
【図4】



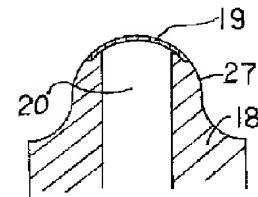
【図5】



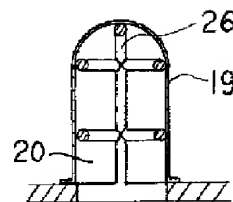
【図6】



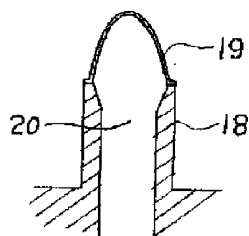
【図10】



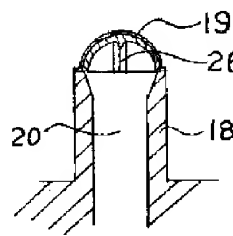
【図9】



【図7】



【図8】



フロントページの続き

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